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# Interdisciplinarity Research in Sustainability: A 15 Year Bibliometric Analysis of Sustainability Journal

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## Abstract

In 2024, *Sustainability* celebrates its 15th year of publication. To commemorate this milestone, this study presents a retrospective bibliometric analysis of the journal, utilizing data from the Scopus database. Through a range of bibliometric tools, we analyze *Sustainability*'s growth in terms of publication and citation impact. Citation data mainly were retrieved from Elsevier's Scopus, the largest abstract and citation database of peer-reviewed literature, comprising scientific journals, books, and conference proceedings. Additionally, data on the most downloaded articles were obtained from *Sustainability's* official website. The most cited articles in *Sustainability* were identified along with the most prolific authors. As of 2023, *Sustainability* has achieved a CiteScore (CS) of 6.8 — an impressive 485% increase from its initial CS of 1.4 in 2011. The journal is indexed under multiple subject categories in Scopus, ranking as follows: Computer Networks and Communications – 95th out of 395 journals; Computer Science (miscellaneous) – 17th out of 133 journals; Energy Engineering and Power Technology - 69th out of 272 journals; Environmental Science (miscellaneous) – 36th out of 219 journals; Geography, Planning and Development – 94th out of 821 journals; Hardware and Architecture – 46th out of 177 journals; Management, Monitoring, Policy and Law – 89th out of 399 journals; and Renewable Energy, Sustainability and the Environment – 97th out of 270 journals. Since its inception in 2009, *Sustainability* has published 65,636 articles from scholars worldwide, with the highest contributions from China and the United States. The journal has primarily published sustainability studies in various aspects, with a predominant emphasis on quantitative methodologies. Although widely used in academia, bibliometric methods might also prove useful in sustainability jurisprudence, such as helping people understand the publication trends in scholarly sustainability journals.

## Keywords

Bibliometrics; Business and International Management; Citation analysis; Communication; Computer Science Applications; Media Technology; Scholarly publishing; Sustainability

## Introduction

The term "interdisciplinarity" refers to the integration of knowledge, methods, and perspectives from multiple disciplines to address complex problems. The Latin word *disciplina*, which means “a branch of instruction or education; a department of learning or knowledge”, is where the term “discipline” originates (Aram, 2004). While knowledge exchange across disciplines has occurred since at least the mid-1920s, the concept of a "discipline" as an organized body of knowledge for teaching and learning dates back to the early Middle Ages. The emergence of interdisciplinarity in the scientific policy agenda, however, did not occur until the latter half of the twentieth century. Its emergence was shaped by broader cultural and intellectual shifts in the Western world during the late 1960s (Wernli, Darbellay and Maes, 2016).

*Sustainability*, an open-access journal, started in March 2009 – more than 12 years after the journal's publisher, ‘Multidisciplinary Digital Publishing Institute’ (MDPI), published their first journal, *Molecules*, in January 1997. The objective of the journal is “to encourage researchers to publish their experimental, computational, and theoretical research relating to natural and applied sciences, engineering, economics, social sciences, and humanities in detail to promote scientific understanding and support impact assessments related to global change and sustainability (About Sustainability, 2024).

Sustainability is an international and cross-disciplinary, academic, open-access journal that publishes research on the technical, environmental, cultural, economic, and social aspects of sustainability. It is a peer-reviewed journal published semi-monthly with no maximum length constraints on reviews, research papers, communications, or short comments. As of October 2024, the journal has a CiteScore (CS) of 6.8 in Elsevier's Scopus database. It is ranked as a Quartile 1 (Q1) journal in Geography, Planning and Development; Computer Science (miscellaneous); Environmental Science (miscellaneous); Management, Monitoring, Policy and Law; Computer Networks and Communications; Quartile 2 (Q2) journal in Energy Engineering and Power Technology; Hardware and Architecture; and Renewable Energy, Sustainability and the Environment. Aligned with the United Nations' 2030 Agenda for Sustainable Development, *Sustainability* seeks to advance global sustainability efforts. The journal promotes open-access and open-science research, encouraging authors to provide full experimental and methodological details to ensure reproducibility and assessment of results. The scope of *Sustainability* includes addressing key challenges in achieving long-term sustainability, such as:

*Enduring difficulties in terms of sustainability*

- Air pollution and climate change
- Water pollution and sanitation
- Land degradation and deforestation, Desertification and drought
- Industrial development and energy crisis
- Toxic chemicals and hazardous, and radioactive wastes
- Population explosion and urbanisation
- Unsustainable patterns of production and consumption

— How globalisation affects regional, national, and local sustainability and stability
— Ecosystem and species decline, with related threats to human health

*Sustainable development through socioeconomic, scientific, and integrative methods*

— Changing patterns of consumption and production
— Advancements in cultural diversity, tradition, social systems, globalisation, immigration, and settlement and their effects on cultural or social sustainability
— Development and realisation of national and international treaties for sustainable development
— Implementation and monitoring of policies for sustainable development
— Aspects of sustainability as they pertain to health and safety
— Sustainability in the context of education and disaster management
— The philosophical and ethical dimensions of sustainable development
— System analysis methods, including life cycle assessment and management
— Sustainable chemistry
— Sustainable utilisation of resources, including land, water, atmosphere, and other biological resources
— New and renewable energy sources
— Sustainable energy preservation and regeneration methods
— Long-term impacts of short-term actions on environmental sustainability
— How climate change affects development and sustainability

Sustainability is a broad field that encompasses various subfields, including:

— Establishing and measuring sustainability
— Developing and implementing sustainability tools
— Studying sustainability in action
— Researching sustainability policies and laws (About Sustainability, 2024).

As of 2024, *Sustainability* accepts the following types of submission for publication:

i. Article
ii. Brief Report
iii. Case Report
iv. Communication
v. Conference Report
vi. Editorial
vii. Essay
viii. Hypothesis
ix. Interesting Images
x. Opinion
xi. Perspective
xii. Project Report
xiii. Protocol
xiv. Registered Report
xv. Technical Note
xvi. Review
xvii. Book Review
xviii. Systematic Review
xix. Abstract and Proceedings of Paper (MDPI Home Page, 2024).

By the time *Sustainability* published its first issue in 2009, the field of sustainability had been evolving for five decades since its emergence in the 1960s. Before this journal, there has been an increased interest in sustainability worldwide. This can be observed in the number of articles published in various journals related to sustainability. A survey of articles published on sustainability between 1996 and 2009 showed 17,226 articles published in the Scopus database (Schoolman *et al.*, 2011). In its inaugural year, *Sustainability* alone contributed 79 articles to this expanding body of research. As a scholarly journal indexed in Elsevier's Scopus database, this article presents a bibliometric evaluation of *Sustainability*. The top ten most referenced articles, authors with the most articles, and overall citation trends in all papers published since 2009. Examining the evolution of the CS of *Sustainability* from 2009 to 2023 allowed us to identify key articles that contributed significantly to the most recent CS (2023).

## Materials and Methods

### *Elsevier's Scopus*

This article was prepared using Scopus, a citation database that uses CiteScore (CS) to rank journals in each of four quartiles (Q1, Q2, Q3, and Q4). Every year in May, the CS is made available for the previous year. Scopus is the biggest database of citations and abstracts for peer-reviewed books, journals, and conference papers. It uses the All Science Journal Classification (ASJC) System to rank over 46,500 academic journals, which are categorised into five main topic areas: interdisciplinary, biological sciences, physical sciences, health sciences, and social sciences and humanities. Table 1 (Elsevier, 2024) shows the further subdivisions of these areas into their respective groups.

Table 1. ASJC Codes and Scopus subject categories.

| *Supergroup* | *ASJC* | *Description* |
|---|---|---|
| Health Sciences | 2700 | General Medicine |
| | 2701 | Medicine (miscellaneous) |
| | 2702 | Anatomy |
| | 2703 | Anesthesiology and Pain Medicine |
| | 2704 | Biochemistry (medical) |
| | 2705 | Cardiology and Cardiovascular Medicine |
| | 2706 | Critical Care and Intensive Care Medicine |
| | 2707 | Complementary and Alternative Medicine |
| | 2708 | Dermatology |
| | 2709 | Drug Guides |
| | 2710 | Embryology |
| | 2711 | Emergency Medicine |
| | 2712 | Endocrinology, Diabetes and Metabolism |
| | 2713 | Epidemiology |
| | 2714 | Family Practice |
| | 2715 | Gastroenterology |
| | 2716 | Genetics (clinical) |
| | 2717 | Geriatrics and Gerontology |
| | 2718 | Health Informatics |

| *Supergroup* | *ASJC* | *Description* |
|---|---|---|
| | 2719 | Health Policy |
| | 2720 | Hematology |
| | 2721 | Histology |
| | 2722 | Immunology and Allergy |
| | 2723 | Internal Medicine |
| | 2725 | Infectious Diseases |
| | 2726 | Microbiology (medical) |
| | 2727 | Nephrology |
| | 2728 | Neurology (clinical) |
| | 2729 | Obstetrics and Gynecology |
| | 2730 | Oncology |
| | 2731 | Ophthalmology |
| | 2732 | Orthopedics and Sports Medicine |
| | 2733 | Otorhinolaryngology |
| | 2734 | Pathology and Forensic Medicine |
| | 2735 | Pediatrics, Perinatology and Child Health |
| | 2737 | Pharmacology (medical) |
| | 2736 | Physiology (medical) |
| | 2738 | Psychiatry and Mental Health |
| | 2739 | Public Health, Environmental and Occupational Health |
| | 2740 | Pulmonary and Respiratory Medicine |
| | 2741 | Radiology, Nuclear Medicine and Imaging |
| | 2742 | Rehabilitation |
| | 2743 | Reproductive Medicine |
| | 2744 | Reviews and References (medical) |
| | 2745 | Rheumatology |
| | 2746 | Surgery |
| | 2747 | Transplantation |
| | 2748 | Urology |
| | 2900 | General Nursing |
| | 2901 | Nursing (miscellaneous) |
| | 2902 | Advanced and Specialized Nursing |
| | 2903 | Assessment and Diagnosis |
| | 2904 | Care Planning |
| | 2905 | Community and Home Care |
| | 2906 | Critical Care Nursing |
| | 2907 | Emergency Nursing |
| | 2908 | Fundamentals and Skills |
| | 2909 | Gerontology |
| | 2910 | Issues, Ethics and Legal Aspects |
| | 2911 | Leadership and Management |
| | 2912 | LPN and LVN |
| | 2913 | Maternity and Midwifery |
| | 2914 | Medical and Surgical Nursing |

| *Supergroup* | *ASJC* | *Description* |
|---|---|---|
| | 2915 | Nurse Assisting |
| | 2916 | Nutrition and Dietetics |
| | 2917 | Oncology (nursing) |
| | 2918 | Pathophysiology |
| | 2919 | Pediatrics |
| | 2920 | Pharmacology (nursing) |
| | 2921 | Psychiatric Mental Health |
| | 2922 | Research and Theory |
| | 2923 | Review and Exam Preparation |
| | 3400 | General Veterinary |
| | 3401 | Veterinary (miscellaneous) |
| | 3402 | Equine |
| | 3403 | Food Animals |
| | 3404 | Small Animals |
| | 3500 | General Dentistry |
| | 3501 | Dentistry (miscellaneous) |
| | 3502 | Dental Assisting |
| | 3503 | Dental Hygiene |
| | 3504 | Oral Surgery |
| | 3505 | Orthodontics |
| | 3506 | Periodontics |
| | 3600 | General Health Professions |
| | 3601 | Health Professions (miscellaneous) |
| | 3602 | Chiropractics |
| | 3603 | Complementary and Manual Therapy |
| | 3604 | Emergency Medical Services |
| | 3605 | Health Information Management |
| | 3606 | Medical Assisting and Transcription |
| | 3607 | Medical Laboratory Technology |
| | 3608 | Medical Terminology |
| | 3609 | Occupational Therapy |
| | 3610 | Optometry |
| | 3611 | Pharmacy |
| | 3612 | Physical Therapy, Sports Therapy and Rehabilitation |
| | 3613 | Podiatry |
| | 3614 | Radiological and Ultrasound Technology |
| | 3615 | Respiratory Care |
| | 3616 | Speech and Hearing |
| Life Sciences | 1100 | General Agricultural and Biological Sciences |
| | 1101 | Agricultural and Biological Sciences (miscellaneous) |
| | 1102 | Agronomy and Crop Science |
| | 1103 | Animal Science and Zoology |
| | 1104 | Aquatic Science |
| | 1105 | Ecology, Evolution, Behavior and Systematics |

| *Supergroup* | *ASJC* | *Description* |
|---|---|---|
| | 1106 | Food Science |
| | 1107 | Forestry |
| | 1108 | Horticulture |
| | 1109 | Insect Science |
| | 1110 | Plant Science |
| | 1111 | Soil Science |
| | 1300 | General Biochemistry, Genetics and Molecular Biology |
| | 1301 | Biochemistry, Genetics and Molecular Biology (miscellaneous) |
| | 1302 | Aging |
| | 1303 | Biochemistry |
| | 1304 | Biophysics |
| | 1305 | Biotechnology |
| | 1306 | Cancer Research |
| | 1307 | Cell Biology |
| | 1308 | Clinical Biochemistry |
| | 1309 | Developmental Biology |
| | 1310 | Endocrinology |
| | 1311 | Genetics |
| | 1312 | Molecular Biology |
| | 1313 | Molecular Medicine |
| | 1314 | Physiology |
| | 1315 | Structural Biology |
| | 2400 | General Immunology and Microbiology |
| | 2401 | Immunology and Microbiology (miscellaneous) |
| | 2402 | Applied Microbiology and Biotechnology |
| | 2403 | Immunology |
| | 2404 | Microbiology |
| | 2405 | Parasitology |
| | 2406 | Virology |
| | 2800 | General Neuroscience |
| | 2801 | Neuroscience (miscellaneous) |
| | 2802 | Behavioral Neuroscience |
| | 2803 | Biological Psychiatry |
| | 2804 | Cellular and Molecular Neuroscience |
| | 2805 | Cognitive Neuroscience |
| | 2806 | Developmental Neuroscience |
| | 2807 | Endocrine and Autonomic Systems |
| | 2808 | Neurology |
| | 2809 | Sensory Systems |
| | 3000 | General Pharmacology, Toxicology and Pharmaceutics |

| *Supergroup* | *ASJC* | *Description* |
|---|---|---|
| | 3001 | Pharmacology, Toxicology and Pharmaceutics (miscellaneous) |
| | 3002 | Drug Discovery |
| | 3003 | Pharmaceutical Science |
| | 3004 | Pharmacology |
| | 3005 | Toxicology |
| Multidisciplinary | 1000 | Multidisciplinary |
| Physical Sciences | 1500 | General Chemical Engineering |
| | 1501 | Chemical Engineering (miscellaneous) |
| | 1502 | Bioengineering |
| | 1503 | Catalysis |
| | 1504 | Chemical Health and Safety |
| | 1505 | Colloid and Surface Chemistry |
| | 1506 | Filtration and Separation |
| | 1507 | Fluid Flow and Transfer Processes |
| | 1508 | Process Chemistry and Technology |
| | 1600 | General Chemistry |
| | 1601 | Chemistry (miscellaneous) |
| | 1602 | Analytical Chemistry |
| | 1603 | Electrochemistry |
| | 1604 | Inorganic Chemistry |
| | 1605 | Organic Chemistry |
| | 1606 | Physical and Theoretical Chemistry |
| | 1607 | Spectroscopy |
| | 1700 | General Computer Science |
| | 1701 | Computer Science (miscellaneous) |
| | 1702 | Artificial Intelligence |
| | 1703 | Computational Theory and Mathematics |
| | 1704 | Computer Graphics and Computer-Aided Design |
| | 1705 | Computer Networks and Communications |
| | 1706 | Computer Science Applications |
| | 1707 | Computer Vision and Pattern Recognition |
| | 1708 | Hardware and Architecture |
| | 1709 | Human-Computer Interaction |
| | 1710 | Information Systems |
| | 1711 | Signal Processing |
| | 1712 | Software |
| | 1900 | General Earth and Planetary Sciences |
| | 1901 | Earth and Planetary Sciences (miscellaneous) |
| | 1902 | Atmospheric Science |
| | 1903 | Computers in Earth Sciences |
| | 1904 | Earth-Surface Processes |
| | 1905 | Economic Geology |
| | 1906 | Geochemistry and Petrology |
| | 1907 | Geology |

| *Supergroup* | *ASJC* | *Description* |
|---|---|---|
| | 1908 | Geophysics |
| | 1909 | Geotechnical Engineering and Engineering Geology |
| | 1910 | Oceanography |
| | 1911 | Paleontology |
| | 1912 | Space and Planetary Science |
| | 1913 | Stratigraphy |
| Social Sciences & Humanities | 1200 | General Arts and Humanities |
| | 1201 | Arts and Humanities (miscellaneous) |
| | 1202 | History |
| | 1203 | Language and Linguistics |
| | 1204 | Archeology (arts and humanities) |
| | 1205 | Classics |
| | 1206 | Conservation |
| | 1207 | History and Philosophy of Science |
| | 1208 | Literature and Literate Theory |
| | 1209 | Museology |
| | 1210 | Music |
| | 1211 | Philosophy |
| | 1212 | Religious Studies |
| | 1213 | Visual Arts and Performing Arts |
| | 1400 | General Business, Management and Accounting |
| | 1401 | Business, Management and Accounting (miscellaneous) |
| | 1402 | Accounting |
| | 1403 | Business and International Management |
| | 1404 | Management Information Systems |
| | 1405 | Management of Technology and Innovation |
| | 1406 | Marketing |
| | 1407 | Organizational Behavior and Human Resource Management |
| | 1408 | Strategy and Management |
| | 1409 | Tourism, Leisure and Hospitality Management |
| | 1410 | Industrial Relations |
| | 1800 | General Decision Sciences |
| | 1801 | Decision Sciences (miscellaneous) |
| | 1802 | Information Systems and Management |
| | 1803 | Management Science and Operations Research |
| | 1804 | Statistics, Probability and Uncertainty |
| | 2000 | General Economics, Econometrics and Finance |
| | 2001 | Economics, Econometrics and Finance (miscellaneous) |
| | 2002 | Economics and Econometrics |
| | 2003 | Finance |

| *Supergroup* | *ASJC* | *Description* |
|---|---|---|
| | 3200 | General Psychology |
| | 3201 | Psychology (miscellaneous) |
| | 3202 | Applied Psychology |
| | 3203 | Clinical Psychology |
| | 3204 | Developmental and Educational Psychology |
| | 3205 | Experimental and Cognitive Psychology |
| | 3206 | Neuropsychology and Physiological Psychology |
| | 3207 | Social Psychology |
| | 3300 | General Social Sciences |
| | 3301 | Social Sciences (miscellaneous) |
| | 3302 | Archeology |
| | 3303 | Development |
| | 3304 | Education |
| | 3305 | Geography, Planning and Development |
| | 3306 | Health (social science) |
| | 3307 | Human Factors and Ergonomics |
| | 3308 | Law |
| | 3309 | Library and Information Sciences |
| | 3310 | Linguistics and Language |
| | 3311 | Safety Research |
| | 3312 | Sociology and Political Science |
| | 3313 | Transportation |
| | 3314 | Anthropology |
| | 3315 | Communication |
| | 3316 | Cultural Studies |
| | 3317 | Demography |
| | 3318 | Gender Studies |
| | 3319 | Life-span and Life-course Studies |
| | 3320 | Political Science and International Relations |
| | 3321 | Public Administration |
| | 3322 | Urban Studies |

A single journal may be assigned to multiple categories. As shown in table 2, *Sustainability* is indexed in four subject categories, each with its respective ranking.

Table 2: Subject areas covered by *Sustainability* in Elsevier's Scopus database

| *Subject Area* | *Category* | *Rank* | *Quartile* |
|---|---|---|---|
| Social Sciences | Geography, Planning and Development | #94/821 | Q1 |
| Computer Science | Computer Science (miscellaneous) | #17/133 | Q1 |
| | Computer Networks and Communications | #95/395 | Q1 |
| | Hardware and Architecture | #46/177 | Q2 |

| | | | |
|---|---|---|---|
| Environmental Science | Environmental Science (miscellaneous) | #36/219 | Q1 |
| | Management, Monitoring, Policy and Law | #89/399 | Q1 |
| Energy | Energy Engineering and Power Technology | #69/272 | Q2 |
| | Renewable Energy, Sustainability and the Environment | #97/270 | Q2 |

The ISSN associated with *Sustainability* was used to retrieve data from the Scopus database. *Sustainability* has been indexed in Scopus since 2009. As of December 2, 2023, the search returned 76,417 results, with the most recent issue being Volume 15(24). Since *Sustainability* is a bimonthly journal, articles published up until December 31, 2023, are assumed to be included in this issue. The number of citations for each article was then sorted in descending order. Every article's title, authors, volume, issue, and page numbers, as well as the year of publication, are all readily available in *Sustainability*. Each article's document type and the number of cited references are also mentioned. Here, it is worth noting that *Sustainability* was a quarterly journal that published four volumes in 2009 (March, June, September, and December) when it was first founded. From Volume 2 (2010) until Volume 10 (2018), the journal published monthly volumes. The publication pattern of the journal has been bimonthly since Volume 11 (2019). From Volume 1(1) (2009) up to Volume 15(24), table 3 displays the distribution of articles published in *Sustainability* by publication pattern, along with the percentage in each pattern.

Table 3: Publication pattern-wise distribution of papers published in *Sustainability* (until Volume 15(24) published in the second half of December 2023).

| *Volume (Issue) (Month & Year)* | *Pattern of Publication* | *N (%)* |
|---|---|---|
| 1(1) (March 2009) to 1(4) (December 2009) | Quarterly | 79 (0.09) |
| 2(1) (January 2010) to 10((12) (December 2018) | Monthly | 10,703 (12.73) |
| 11(1) (January 2019) to 15(24) (December-2 2023) | Bi-monthly | 65,636 (85.8) |
| Total papers published | | 76,417 (100) |

The CS provided by Scopus helps determine the quality of the journal in that specific subject area. *Sustainability* is indexed in four categories, with a ranking falling in the first 25% of journals in a few categories and a ranking falling in the second 50% of journals in certain categories. Thus, *Sustainability* ranks as a 1st Quartile (Q1) journal in some categories and a 2nd Quartile (Q2) journal in others, as shown in table 2.

### *CS and CS Percentile*

Scopus was used to gather the CS of *Sustainability* and other citation data (2023). Topics covered by this journal include computer science, energy, environmental science, and

social sciences. The number of citations received on average for each article published in a journal is measured by CS. CS values for a given journal are based on the citation counts received in that year plus the citation counts received in the three preceding calendar years for articles published in the journal during those four years, divided by the total number of articles published in the journal during that time. Clarivate's CiteScore (CS) impact factor (IF), introduced in December 2016 as an alternative to the Journal Citation Reports (JCR) IF, is calculated based on citations from the past four years, whereas JCR uses a two- or five-year window.

*Present Formula for CS Calculation*

For any particular year, the CiteScore of a journal can be determined by dividing the total number of citations received for all documents published in the journal over the last four years by the total number of documents published in the journal over the same period. This includes articles, reviews, conference papers, book chapters, and data papers (Scopus, 2024).

$$CS_y = \frac{Citations\ (y)+Citations\ (y-1)+Citations\ (y-2)+Citations\ (y-3)}{Publications\ (y)+\ Publications\ (y-1)+\ Publications\ (y-2)+\ Publications\ (y-3)}$$

y = The particular year for which CS is to be calculated.
$CS_y$ = CS in a specific year, such as "2025"
Citations (y) = Total citations in the CS year, such as "in 2025".
Citations (y-1) = Total citations in the CS year for items published in "year-1".
Citations (y-2) = Total citations in the CS year for items published in "year-2".
Citations (y-3) = Total citations in the CS year for items published in "year-3".
Publications (y) = Total number of publications in CS year, such as "in 2025."
Publications (y-1) = Total number of publications in "year-1".
Publications (y-2) = Total number of publications in "year-2".
Publications (y-3) = Total number of publications in "year-3".

*Pre-2020 Formula for CS Calculation*

Before 2020, the CS of a journal was determined by dividing the total number of citations received in that year from articles published in that journal over the preceding three years by the total number of "citable items" published in that journal over the same period. [7]

$$CS_y = \frac{Citations\ (y)}{Publications\ (y-1)+\ Publications\ (y-2)+\ Publications\ (y-3)}$$

where,
$CS_y$ = CS in a specific year, such as "2025
Citations (y) = Total citations in the CS year, such as "in 2025".
Publications (y-1) = Total number of citable items published in "year-1".
Publications (y-2) = Total number of citable items published in "year-2".
Publications (y-3) = Total number of citable items published in "year-3".

*CS Percentile*

A serial title's relative status in its subject field can be shown by the CS Percentile. A subject field's number of serial titles was used to divide it into 100 equal-sized

percentiles, and each percentile was assigned a serial title based on its CS. A 96% CS Percentile indicates that, relative to other serial titles in the same category, this one is as high as or higher than 96% of them. The CS Percentile is calculated by sorting all serial titles with CS in a given field title from high to low. By using the following formula, the CS Percentile for a serial title S was calculated:

$$\text{CS Percentile of S} = [\ (L + (0.5 \times S))/\ N] \times 100$$

where,
L = number of serial titles in the subject field with a CS lower than X
S = number of serial titles in the subject field with CS X
N = total number of serial titles in the subject field with any CS

### *Performance Indicators*

The present study used a range of performance indicators in order to evaluate *Sustainability's* performance over the years, such as: most prolific authors, most prolific institutions, and most prolific countries, highly cited papers, and highly downloaded papers. These data, except for the last, were generated from the Scopus database using institutional access through Nirma University's library. The data for the last one was generated from *Sustainability's* website.

## Results

### *Characteristics of document type*

According to the document type, table 4 lists all 76,417 items published in *Sustainability* since 2009. While editorials made up 0.7% of the total, the vast majority of the published items were original research articles (n = 71,077, or 93%). The second group likely signifies the introduction of something new, such as a journal, section, editor-in-chief, special issue, or invited editorial. Among the document types, 4,563 (6%) were review articles, 86 (0.1%) were notes, and 16 (0%) were letters. In addition, there were two conference papers and one item each for short surveys and data papers.

Table 4: Classification of documents published in *Sustainability* between 2009 and 2023 (published until Vol. 15(24) December 2 2023)

| *Type of Submission* | *N (%)* |
|---|---|
| Article | 71,077 (93) |
| Review | 4,563 (6) |
| Editorial | 516 (0.7) |
| Erratum | 142 (0.2) |
| Note | 86 (0.1) |
| Letter | 16 (0.0) |
| Retracted | 13 (0.0) |
| Conference paper | 2 (0.0) |
| Short survey | 1 (0.0) |
| Data paper | 1 (0.0) |

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### *Growth in the number of items published in Sustainability*

Figure 1 shows the year-by-year analysis of the number of items published in *Sustainability* between 2008 and 2024 (until Vol. 16(17), September 1, 2024). The journal reached its peak publication volume in 2022, with 17,007 papers. The number of published papers in *Sustainability* has gradually increased since 2010, following an initial publication of 78 papers in 2009. The count rose to 199 in 2010 but dropped to 128 in 2011. From 2012 onward, the number steadily increased, doubling in 2018 compared to 2017. During the first five publication years of *Sustainability* (2013-2017), 851 substantive items were published. In contrast, 65,636 items were published between 2019 and 2023, representing a 7,612.81% increase.

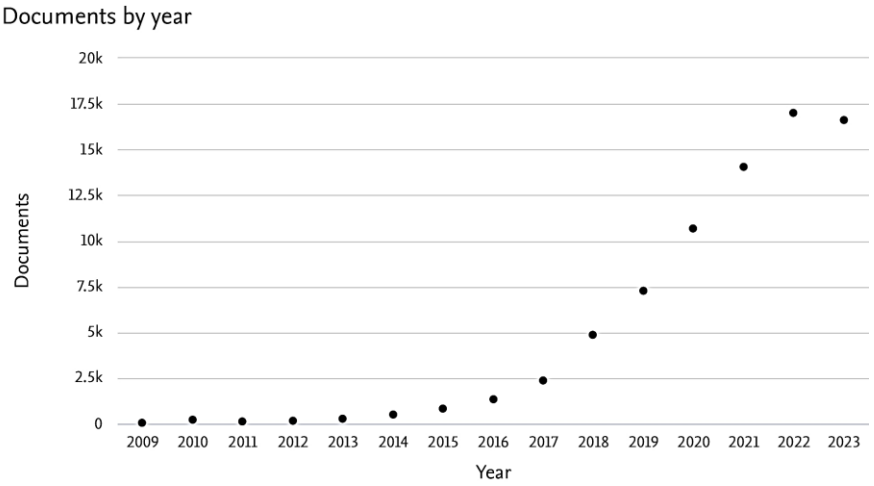


Figure 1: Trends in the number of items published in *Sustainability* between 2009 and 2023. A score between 15k and 17.5k represents the highest number of items published in 2022

### *Most highly cited papers of Sustainability*

The top ten most cited papers and articles published in *Sustainability* between 2009 and 2023 are listed in table 5 along with the publication year, item type, total number of citations, number of authors, first and last name of each author, number of citations per author, and the citation impact of each item. The number of articles and reviews on the list was initially equal. The article by Aristovnik *et al.* (2020) is at the top of the list because it examines how students worldwide view the effects of the first wave of the COVID-19 pandemic in early 2020. Female, full-time, first-level students, as well as students dealing with financial difficulties were typically more emotionally and personally impacted by the pandemic, according to the results, while male, part-time, first-level, applied science students, those from lower-income backgrounds, and students from Asia or Africa were much less satisfied with their academic work/life throughout the crisis. The article has received the highest number of citations (1,123), likely due to the widespread impact of the COVID-19 pandemic.

Soil erosion mitigation was the focus of two highly referenced articles that aimed to improve pore geometry and structural stability, increase the activity and species variety of soil biota (micro, meso, and macro), and produce positive SOC and N budgets. By enhancing soil fertility, improving soil structure, and increasing the soil organic carbon pool, we can lessen the likelihood of physical, chemical, biological, and ecological soil degradation, which in turn improves environmental conditions (Lal, 2015) We can also learn more about how plants and microbes can tolerate and break down heavy metals, focusing on the genetics of plants that accumulate these pollutants and the genes that play a role in tolerance and detoxification (Dixit *et al.*, 2015).

Other examples of highly cited *Sustainability* publications in the top ten dealt with reviews of thermal energy storage (Sarbu and Sebarchievici, 2018), a human-centric solution to industry 5.0 (Nahavandi, 2019), the drivers of industry 4.0 (Müller, Kiel and Voigt, 2018), sustainability as a policy concept (Rizos *et al.*, 2016) and the implementation of Circular Economy Business Models by Small and Medium-Sized Enterprises (SMEs) (Aschemann-Witzel *et al.*, 2015).. Among the top three items, the third position was occupied by a review and not an article (Dixit *et al.*, 2015). Among the top ten, both the first and third positions were secured by reviews, which contrasts slightly with the results shown in table 4. Table 4, alongside table 5, reveals another interesting point: 80% (8) of the top ten highly cited papers were published between 2010 and 2018, during which *Sustainability* released monthly issues. Only one paper (10%) is from the present time when *Sustainability* follows a bi-monthly publication pattern, whereas no paper is in the list when *Sustainability* followed a quarterly publication pattern. This contrasts with the findings in table 5.

Table 5: The top ten most highly cited articles were published in *Sustainability*, patterns of co-authorship, and citation impact

| *Cited article title [reference]* | *Publication year* | *Item type* | *Total cites* | *Number of authors* | *First/last Author* | *Cites per author* | *Cites per year** |
|---|---|---|---|---|---|---|---|
| Impacts of the COVID-19 Pandemic on Life of Higher Education Students: A Global Perspective (Aristovnik *et al.*, 2020) | 2020 | Article | 1140 | 5 | Aristovnik/ Umek | 228 | 285 |
| Restoring Soil Quality to Mitigate Soil Degradation (Lal, 2015) | 2015 | Article | 1019 | 1 | Lal | 1019 | 113.2 |
| Bioremediation of Heavy Metals from Soil and Aquatic Environment: An Overview of Principles and Criteria of Fundamental Processes (Dixit *et al*., 2015) | 2015 | Review | 1010 | 12 | Dixit/Paul | 84.1 | 112.2 |
| Designing the Business Models for Circular Economy—Towards the Conceptual Framework (Lewandowski, 2016) | 2016 | Review | 966 | 1 | Lewandowski | 966 | 120.75 |
| A Comprehensive Review of Thermal Energy Storage (Sarbu and Sebarchievici, 2018) | 2018 | Review | 836 | 2 | Sarbu/ Sebaechievici | 418 | 139.3 |
| Industry 5.0—A Human-Centric Solution (Nahavandi, 2019) | 2019 | Article | 800 | 1 | Nahavandi | 800 | 160 |
| What Drives the Implementation of Industry 4.0? The Role of Opportunities and Challenges in the Context of Sustainability (Müller, Kiel and Voigt, 2018) | 2018 | Article | 724 | 3 | Müller/Voigt | 241.3 | 120.67 |
| What is Sustainability? (Kuhlman and Farrington, 2010) | 2010 | Review | 692 | 2 | Kuhlman/ Farrington | 346 | 49.4 |

| *Cited article title [reference]* | *Publication year* | *Item type* | *Total cites* | *Number of authors* | *First/last Author* | *Cites per author* | *Cites per year** |
|---|---|---|---|---|---|---|---|
| Implementation of Circular Economy Business Models by Small and Medium-Sized Enterprises (SMEs): Barriers and Enablers (Rizos *et al.*, 2016)[ | 2016 | Article | 691 | 11 | Rizos/Topi | 62.8 | 76.78 |
| Consumer-Related Food Waste: Causes and Potential for Action (Aschemann-Witzel *et al.*, 2015)[ | 2015 | Review | 616 | 5 | Aschemann-Witzel/ Oostindjer | 123.2 | 68.4 |

*From publication year till 31-12-2023.

### *Most highly downloaded papers of Sustainability*

The top ten most highly downloaded articles (all time) published in *Sustainability* between 2009 and 2023 are listed in table 6, along with the publication year, item type, total downloads, number of authors, surnames of first and last authors, downloads per author, and download impact of the published papers (downloads/year). At the very top is a review by Li, Mirosa and Bremer (2020), which explores the impact of online meal delivery through the lens of the three pillars of sustainability—economic, social, and environmental. One of the highly downloaded papers examines how sustainability and circular economy principles affect principles influence the perception of the fashion industry among new generations of consumers (Gazzola *et al.*, 2020). Another focuses on the modified SERVQUAL model, exploring the dimensions of service quality — such as tangibles, responsiveness, empathy, assurance, reliability, access, financial aspects, and employee competencies — and their impact on customer satisfaction in Jordanian banks (Pakurár *et al.*, 2019). Interestingly, papers that were highly cited, as shown in table 5, occupied the seventh position in the most downloaded category (Aristovnik *et al.*, 2020). Other examples of highly downloaded *Sustainability* papers that made up the top-ten dealt with the non-preparedness of Romanian higher education institutions for exclusive online learning, either due to technical issues, or lack of teachers' technical skills, or due to lack of communication of students with their teachers (Coman *et al.*, 2020), the impact of social media on learning behaviour of students in Pakistan (Abbas *et al*., 2019), the link between employee development and work time and workspace flexibility as relevant characteristics of sustainable human resource management (HRM), job satisfaction, and job performance among Romanian employees to identify how to redesign HRM in the face of "future work" challenges (Davidescu *et al.*, 2020), and examination of students' perception and readiness about online learning systems adopted at the university level during the ongoing COVID-19 pandemic (Khan *et al.*, 2021). Comparing tables 5 and 6, it is evident that a highly cited paper may not necessarily be a highly downloaded one. This may be because *Sustainability* is an open-access journal, which makes the entire paper available on the journal website. This enabled the reader to read the entire paper without downloading it. Table 6 shows that 80% of the items are articles authored by Aristovnik *et al*. (2020), Gazzola *et al.* (2020), Pakurár *et al.* (2019), Coman *et al.* (2020), Abbas *et al.* (2019), Davidescu *et al.* (2020), Khan *et al.* (2021) and Gelleri (2022), while 20% are reviews (Sarbu and Sebarchievici, 2018; Li, Mirosa and Bremer, 2020). Table 6 presents another interesting point. Out of the top ten downloaded papers, 90% (9) were from the period 2019-2022, when *Sustainability* transitioned to a bi-monthly publication pattern, while none are from 2009, when the journal followed a quarterly publication schedule. This contrasts with the findings in table 5.

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Table 6: The top ten most downloaded articles published in *Sustainability*, pattern of co-authorship, and download impact

| *Cited article title [reference]* | *Publication year* | *Item type* | *Total downloads* | *Number of authors* | *First/last Author* | *Downloads per author* | *Downloads per year** |
|---|---|---|---|---|---|---|---|
| Review of Online Food Delivery Platforms and their Impacts on Sustainability (Li, Mirosa and Bremer, 2020) | 2020 | Review | 211753 | 3 | Li/Bremer | 70,584.3 | 52,938.25 |
| Trends in the Fashion Industry. The Perception of Sustainability and Circular Economy: A Gender/Generation Quantitative Approach (Gazzola *et al.*, 2020) | 2020 | Article | 211595 | 4 | Gazzola/ Grechi | 52,898.75 | 52,898.75 |
| The Service Quality Dimensions that Affect Customer Satisfaction in the Jordanian Banking Sector (Pakurár *et al.*, 2019) | 2019 | Article | 183121 | 5 | Pakurár/ Oláh | 36,624.2 | 36,624.2 |
| Online Teaching and Learning in Higher Education during the Coronavirus Pandemic: Students' Perspective (Coman *et al.*, 2020) | 2020 | Article | 182548 | 5 | Coman/ Bularca | 36509.6 | 45,637 |
| The Impact of Social Media on Learning Behaviour for Sustainable Education: Evidence of Students from Selected Universities in Pakistan (Abbas *et al.*, 2019) | 2019 | Article | 179012 | 4 | Abbas/ Bano | 44,753 | 35,802.4 |
| Work Flexibility, Job Satisfaction, and Job Performance among Romanian Employees — Implications for Sustainable Human Resource Management (Davidescu *et al.*, 2020) | 2020 | Article | 173439 | 4 | Davidescu/ Casuneanu | 43,359.75 | 43,359.75 |
| Impacts of the COVID-19 Pandemic on Life of Higher Education Students: A Global Perspective (Aristovnik *et al.*, 2020) | 2020 | Article | 151057 | 5 | Aristovnik / Umek | 30,211.4 | 37,764.25 |
| Students' Perception towards E-Learning during COVID-19 Pandemic in India: An Empirical Study (Khan *et al.*, 2021) | 2020 | Article | 147217 | 5 | Khan/ Tahir | 29,443.4 | 36,804.25 |
| Creating Monetary Collaborative Spaces for Social and Ecological Transformation (Gelleri, 2022) | 2018 | Review | 133193 | 2 | Sarbu/ Sebarch-ievici | 66,596.5 | 22,198.8 |
| A Comprehensive Review of Thermal Energy Storage (Sarbu and Sebarchievici, 2018) | 2018 | Review | 132259 | 1 | Gelleri | 132259 | 22,043.16 |

*From publication year till 31-10-2024.

### *Organizations and Countries Making the Most Contributions*

Between 2009 and 2023, the top ten organisations publishing in *Sustainability* are listed in table 7. Topping the list with 1288 publications is the Chinese Academy of Sciences (China). Organisations and universities from China claimed eight of the top ten spots, with Saudi Arabia and Bangladesh each having two representatives.

Table 7: Top ten organizations contributing articles to *Sustainability* from 2009 to 2023

| *Rank* | *Organization/university* | *Country* | *Number of items* |
|---|---|---|---|
| 1 | Chinese Academy of Sciences | People's Republic of China | 1288 |
| 2 | Ministry of Education of the People's Republic of China | People's Republic of China | 983 |
| 3 | University of Chinese Academy of Sciences | People's Republic of China | 697 |

| | | | |
|---|---|---|---|
| 4 | King Saud University | Kingdom of Saudi Arabia | 656 |
| 5 | Tongji University | People's Republic of China | 471 |
| 6 | Zhejiang University | People's Republic of China | 447 |
| 7 | Beijing Normal University | People's Republic of China | 441 |
| 8 | Southeast University | Bangladesh | 365 |
| 9 | China University of Mining and Technology | People's Republic of China | 363 |
| 10 | Tsinghua University | People's Republic of China | 362 |

Similarly, table 8 lists the top ten countries contributing the most articles to *Sustainability* over the same period. The table reveals that China, the USA, Spain, and Italy had the highest contributions. There might be a connection between the number of contributions and open-access publishing requirements in these nations. The requirement of an open-access publishing model allows for the wider dissemination of knowledge in academic journals. Alternatively, this may also mean that these publications are sponsored by funding agencies, mandating open-access publishing.

Table 8: The top ten countries contributing the most articles to *Sustainability* from 2009 to 2023.

| *Rank* | *Country* | *Number of items* |
|---|---|---|
| 1 | China | 19,874 |
| 2 | United States | 4,921 |
| 3 | Spain | 4,883 |
| 4 | Italy | 4,418 |
| 5 | South Korea | 4,290 |
| 6 | United Kingdom | 3,130 |
| 7 | Saudi Arabia | 2,919 |
| 8 | Poland | 2,688 |
| 9 | Germany | 2,479 |
| 10 | Australia | 2,073 |

### *Most Prolific Authors Contributing Articles in Sustainability*

Table 9 lists the top ten prolific authors publishing papers in *Sustainability*, along with their affiliated e-organizations and/or universities and countries of residence. Topping the list is Marc A. Rosen from the University of Ontario Institute of Technology (Canada) with 60 papers. Luca Salvati, affiliated to the Council for Agricultural Research and Analysis of Agricultural Economics (Italy) came second with 53 papers, while Heesup Han, affiliated to Sejong University (Republic of Korea) came third with 52 papers. A comparison of table 8 and table 9 reveals two key observations. First, although China has published the most papers in *Sustainability*, none of its authors rank among the top contributors. Second, the top ten most prolific contributors (listed in Table 9) do not include any authors from the USA or Spain.

Table 9: Top ten most prolific contributors to papers published in *Sustainability* 2009-2023

| *Rank* | *Contributor* | *Organization or University* | *Country* | *Sustainability articles 2009-2023* |
|---|---|---|---|---|
| 1 | Rosen, M.A. | University of Ontario Institute of Technology | Canada | 60 |
| 2 | Salvati, L. | Council for Agricultural Research and Analysis of Agricultural Economics | Italy | 53 |
| 3 | Han, H. | Sejong University | Republic of Korea | 52 |
| 4 | Tsai, S.B. | University of Electronic Science and Technology | China | 48 |
| 5 | Streimikiene, D. | Vilnius University | Lithuania | 47 |
| 6 | Yoo, S.H. | Seoul National University of Science & Technology | Republic of Korea | 46 |
| 7 | Choi, Y. | Inha University | Republic of Korea | 48 |
| 8 | Hwang, J. | Sejong University | Republic of Korea | 42 |
| 9 | Finkbeiner, M. | Technical University of Berlin | Germany | 42 |
| 10 | Zavadskas, E.K. | Vilnius Gediminas Technical University | Lithuania | 38 |

### *Changes in the CiteScore of Sustainability over time*

Figure 2 shows how the CiteScore of *Sustainability* varied between 2011 and 2023. This graph shows that CS increased almost fivefold over this period. In 2011, when the CS was given for the first time to *Sustainability*, based on the publications of 2009-2011, the CS was 1.4. For 2012 and 2013, CS increased but was under 2.0. In 2016 and 2017, CS saw a 0.4 increase, reaching 2.1 and 2.5, respectively. In 2021, the CS of *Sustainability* witnessed a jump of 1.1, reaching 5.0. This was following the year when the most cited items were published in *Sustainability*. The present CS of *Sustainability* is 6.5, increasing from 5.8 in 2022. The projected CS for 2024 (calculated in the spring

of 2025), as shown on the Scopus website, is 6.8 (as calculated on October 5, 2024) (Scopus, 2024).

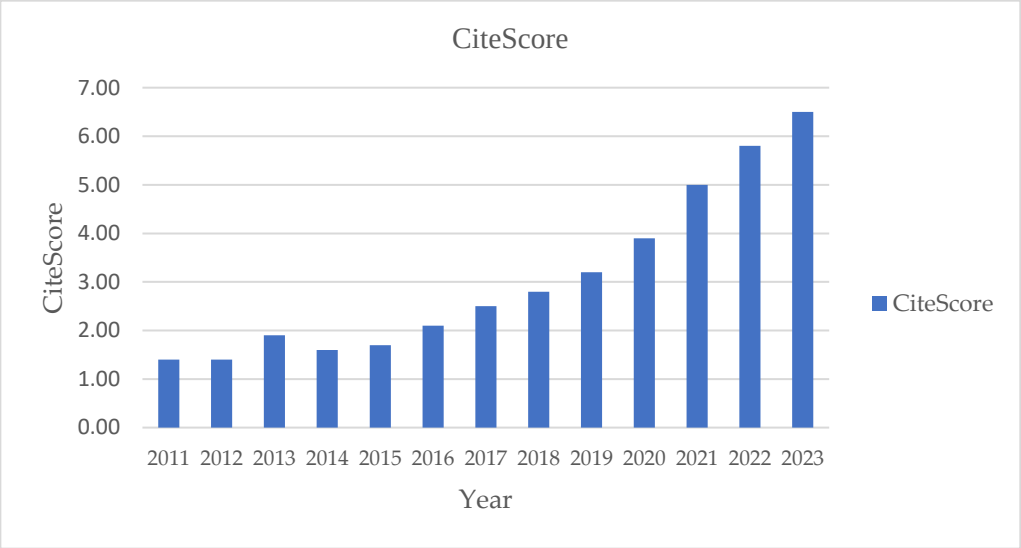


Figure 2: Changes in the CiteScore of *Sustainability* between 2011 and 2023 (MDPI, 2024).

## 4. Discussion

Forensic science, psychiatry, and agriculture are just a few of the fields that have benefited from bibliometric studies (Fasciolo, Panza and Lombardi, 2024; Fu *et al.*, 2024; Jones, 2023). *Sustainability*, a journal primarily concerned with sustainability studies, has published a number of bibliometric studies since its founding, however, the method's origins are in library and information sciences. The Directory of Open Access Journals (DOAJ) was established in 2003 during Lund University's first Nordic Conference on Scholarly Communication in 2002. Lars Bjornshauge, the Director of Libraries at Lund University, was its director (Wijewickrema, 2022). The following ten years, he worked in a directory. The DOAJ refers to open access journals as "scientific and scholarly journals that meet high-quality standards by exercising peer-review or editorial quality control, and that use a funding model that does not charge readers or their institutions for access" (Thavamani, 2013). "Read, download, copy, distribute, print, search, or link to the full texts of these articles " (Budapest Open Access Initiative, 2024) are the rights granted to readers by an open-access journal that is included in the directory, according to the Budapest Open Access Initiative's definition of open access.

Launched in 2009, MDPI's *Sustainability* is a publication that is completely open-access. All articles in *Sustainability*, whether they are published in a regular or special issue, are freely accessible for reading, downloading, and citing. The two models of Open Access ('OA') that are followed by *Sustainability* are Gold OA and Green OA. Everyone, everywhere, can view the final published version of the essay because it is freely and permanently available online. Because the APC is charged, this easy availability is possible. The latter allows the author to self-archive, or make available online, previous versions of the manuscript without having to pay an APC (Taylor and Francis, 2024).

The significant increase in the publications of *Sustainability* shows the reputation of the journal in the subject categories it covers. It can also be linked to an increase in the number of items published in *Sustainability*, ultimately assuring readers and authors of its stringent peer-review process and its assurance of quality in the published materials.

However, concerns have been raised over *Sustainability's* fast turnaround with special issues and quick publication time (Khrono, 2024), focusing on volume rather than quality (Khrono, 2024) and reported paper mill activities (Else, 2023). Such was the gravity of the allegations against *Sustainability* that Scopus reevaluated it (Kincaid, 2024a), but continued its inclusion after reevaluation (Kincaid, 2024b). The continuation of the inclusion of *Sustainability* in the Scopus database shows that it adheres to Scopus' content selection standards. A common practice in scholarly journals is to publish papers and then retract them for any of the following reasons:

- Research mistakes;
- Problems with the research's reproducibility;
- Plagiarism;
- Falsification of data or results;
- Fabrication of data or results;
- Copyright infringement;
- Failure to disclose conflict of interest; or
- No institutional review board has approved research on human subjects or animals (COPE Guidelines, 2024)

*Sustainability*, which has been publishing papers since 2009 and is indexed in Elsevier's Scopus DB, has retracted 13 published papers on the following grounds:

- Overlap with previously unpublished article (Yoon and Jeong, 2016), even in another language (Heredia *et al.*, 2024); or
- Overlap with previously unpublished thesis (Madhloom *et al.*, 2018; Ma *et al.*, 2023; Memon *et al.*, 2024); or
- Overlap with previously unpublished research project (Karim *et al.*, 2020); or
- Overlap with previously published manuscript (article/thesis) (Baig *et al.*, 2023; Campos-Arteaga *et al.*, 2024; Ding *et al.*, 2023; Musharavati, 2024), even in another language (Lai and Lee, 2024); or
- Overlap of images and validity of the study's research (Alyousef *et al.*, 2024; Wang and Chen, 2024).

The above reasons demonstrate the stringent policy of *Sustainability* and its adherence to quality after following its complaint procedure. Table 10 shows the time of retraction notice since publication of the article. As per Table 10, the average time for retraction of an article from its publication is ≅14.7 months.

Table 10: Trends in retracted articles published in *Sustainability* from 2009-2023

| *Sr. No.* | *Reason for Retraction* | *Title of article [reference]* | *Volume & Issue of Publication – Month & Year* | *Volume & Issue of Retraction Notice – Year* | *Duration from Publication to Retraction (in months)* |
|---|---|---|---|---|---|
| 1 | Overlapping with a previously unpublished article | Carbon Emission Mitigation Potentials of Different Policy Scenarios and Their Effects on International Aviation in the Korean Context (Yoon and Jeong, 2016) | 8(11) – November 2016 | 10(8) – August 2018 | 21 months |
| 2 | Overlapping with a previously unpublished article in another language | Evaluation of a Microbial Consortium and Selection of a Support in an Anaerobic Reactor Directed to the Bio-Treatment of Wastewater of the Textile Industry (Heredia *et al.*, 2024) | 14(14) – July 2022 | 16(19) – September 2024 | 26 months |
| 3 | Overlapping with a previously unpublished thesis | Modeling Spatial Distribution of Some Contamination within the Lower Reaches of Diyala River Using IDW Interpolation (Madhloom *et al.*, 2018) | 10(1) – December 2017 | 11(4) – February 2019 | 14 months |
| | | Research on Fatigue Prediction Model of Asphalt Mixture with High RAP Content (Ma *et al.*, 2023) | 13(14) – July 2021 | 15(18) – September 2023 | 26 months |
| | | Investigation of the Physical Properties of Yarn Produced from Textile Waste by | 14(15) – August 2022 | 16(5) – February 2024 | 18 months |

| *Sr. No.* | *Reason for Retraction* | *Title of article [reference]* | *Volume & Issue of Publication – Month & Year* | *Volume & Issue of Retraction Notice – Year* | *Duration from Publication to Retraction (in months)* |
|---|---|---|---|---|---|
| | | Optimizing Their Proportions (Memon *et al.*, 2024) | | | |
| 4 | Overlapping with a previously unpublished research project | Paving towards Strategic Investment Decision: A SWOT Analysis of Renewable Energy in Bangladesh (Karim *et al.*, 2020) | 12(24) – December 2020 | 13(12) – June 2021 | 6 months |
| 5 | Overlap with a previously published manuscript (article/thesis) | Digital Entrepreneurship: Future Research Directions and Opportunities for New Business Model (Baig *et al.*, 2023) | 14(9) – April 2022 | 15(7) – March 2023 | 11 months |
| | | Campos-Arteaga *et al.* Prediction of Consumption of Local Wine in Italian Consumers Based on Theory of Planned Behavior (Campos-Arteaga *et al.*, 2024) | 14(22) – November 2022 | 16(14) – July 2024 | 20 months |
| | | Study on Mechanical Properties of Soil Stabilization by Different Vegetation Roots on High Steep Slope (Ding *et al.*, 2023) | 15(3) – January 2023 | 15(14) – July 2023 | 6 months |
| | | A Study on Life Cycle Impact Assessment of Seawater Desalination Systems: | 15(24) – December 2023 | 16(8) – April 2024 | 4 months |

| *Sr. No.* | *Reason for Retraction* | *Title of article [reference]* | *Volume & Issue of Publication – Month & Year* | *Volume & Issue of Retraction Notice – Year* | *Duration from Publication to Retraction (in months)* |
|---|---|---|---|---|---|
| | | Seawater Reverse Osmosis Integrated with Bipolar-Membrane-Enhanced Electro-Dialysis Process (Musharavati, 2024) | | | |
| 6 | Overlap with previously published manuscript (article/thesis) in another language | An Exploratory Study of the Intrinsic Mechanisms of Occupational Stigma Consciousness, Career Development, and Work–Life Balance among Female Leaders (Lai and Lee, 2024) | 15(22) – November 2023 | 16(5) – February 2024 | 3 months |
| 7 | Overlapping of images and validity of the study's research | Durability Enhancement of Sustainable Concrete Composites Comprising Waste Metalized Film Food Packaging Fibers and Palm Oil Fuel Ash (Alyousef *et al.*, 2024) | 14(9) – April 2022 | 16(4) – February 2024 | 22 months |
| | | Digital Transformation and Enterprise Resilience: Evidence from China (Wang and Chen, 2024) | 14(21) – October 2022 | 16(3) – January 2024 | 15 months |

## Conclusion

Using a variety of approaches, including descriptive statistics, we examined the bibliometric data provided by *Sustainability* journals in Elsevier's Scopus database to determine how much they contributed between 2009 and 2023 in this study. Our study's findings were compared to the sustainability landscape on a number of metrics to review interdisciplinary research in Sustainability, including the trend in CiteScore, the number of retractions, the number of articles cited, and the authors and articles with the highest citation counts. *"Sustainability"* celebrated its 15 years of publication in 2024. In order to better understand the journal's contribution to the development of interdisciplinary research in sustainability, this study used a number of quantitative parameters. As time has progressed, the journal has grown into a leading voice in sustainability studies. Based on our findings, *Sustainability's* free-of-charge open-access research strategy has allowed it to have a substantial impact in its field. On the one hand, the journal has done a great job of attracting scholarship on a wide variety of topics, including sustainability landscapes, machine learning, and library and information science. Conversely, through partnerships with organisations such as ULI, CIB, and the Canadian Urban Transit Research & Innovation Consortium (CUTRIC), the journal has promoted research networking on both a national and international scale. Novel topics previously examined by sustainability research studies can find a home in this journal, which acts as an incubator for new research.

The development of an international collaboration network for sustainability researchers is prompted by global scholarship, which increases the variety and breadth of research outputs on a variety of topics. Researchers are certain of more visibility and influence due to the high degree of collaboration between scientists and sustainability researchers. In addition, we conclude that the journal can be used as a template for future South-South collaboration and partnerships between Global South nations, to foster mutual development. South-South cooperation can only flourish when both sides work to better understand and address one another's needs and opportunities, when lines of communication are open and honest, and when projects with shared benefits are actively pursued. This has the potential to enhance programs for scientific exchange and make technology transfer easier.

This study is the first of its kind to conduct an extensive examination of citation metrics in Sustainability, identifying the most cited articles, the most prolific authors, and the total number of published articles. By doing so, it aims to encourage further bibliometric and quantitative evaluations of sustainability-related interdisciplinary research. Beyond its applications in library and academic research, bibliometrics can also help assess the impact of key publications (through citation analysis) and verify the credentials of potential expert witnesses.

*Limitations*

It should be noted that this study does have certain limitations. The first limitation was the source of bibliometric data. This study is vulnerable to errors in the source data because it relies solely on Scopus, a well-known database of scientific articles. However, we cleaned the data by deleting duplicates and unauthored papers. The study may still

be somewhat affected by source errors, even though this helps to minimize them. For instance, Scopus employs complete counting, which entails assigning each co-author of an article a unit. Consequently, articles with many co-authors may perform better than those with fewer than two. Future researchers can solve this problem by creating their datasets. Second, the scope of this study is limited. Trends in the journal's co-authors, techniques, and theoretical frameworks were covered in this study. This study did not have the time or resources to delve deeply into these aspects; however, they are worth exploring. Future researchers can conduct separate systematic literature and bibliometric reviews. We utilized multiple bibliometric methods to conduct a retrospective study. Third, the authors' affiliations are not uniform; the same writers may have various affiliations for different articles. It is recommended to perform updates to spot new trends, as the results display a fixed image of *Sustainability* features. Despite these restrictions, this bibliometric research outlines the most significant trends in the *Sustainability* journal, which have consistently varied in their authors' and topical scope while demonstrating outstanding development in their influence over the field.

*Future Directions*

We look forward to studying the impact of popular publishers' free-of-charge open-access policy on the internationalization of their editorial boards, readership, and citations in the future.

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## Authors' Declarations and Essential Ethical Compliances

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| *Contribution* | *Author 1* | *Author 2* | *Author 3* |
|---|---|---|---|
| Conceived and designed the research or analysis | Yes | Yes | Yes |
| Collected the data | Yes | No | No |
| Contributed to data analysis & interpretation | Yes | Yes | Yes |
| Wrote the article/paper | Yes | Yes | No |
| Critical revision of the article/paper | No | Yes | Yes |
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The author(s) solemnly declare(s) that this research has not involved any human subject (body or organs) for experimentation. It was not a clinical research. The contexts of human population/participation were only indirectly covered through literature review. Therefore, an Ethical Clearance (from a Committee or Authority) or ethical obligation of Helsinki Declaration does not apply in cases of this study or written work.

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